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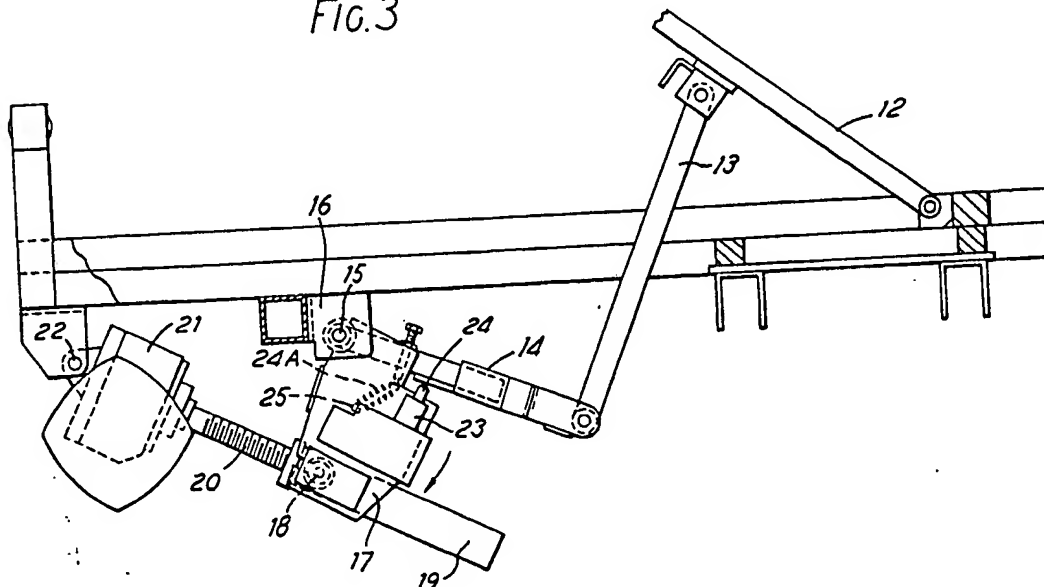
(56) Documents cited
GB A 2167289 GB 1583593 EP A2 0183371
EP A2 0146914 FR A 2351629 US 4534077
US 4463463 US 4407030 US 4120057
 Note: GB A 2167289 and EP A2 0183371 are
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 US 4120057 are equivalent;

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(54) **Bed with hinged panel safety feature**

(57) The invention provides a bed including at least one hinged panel, such as a back rest or leg raising panel 12, the panel being tiltable by a motor 21 operating through a linkage, and means being provided to stop the motor, during the lowering of the panel, if the movement of the panel is obstructed or inhibited e.g. by a person's arm. Specifically, a switch 23 has a plunger 24 held in contact with linkage 14 by a spring 24A. Obstruction of the movement breaks this contact and stops the motor.

FIG.3



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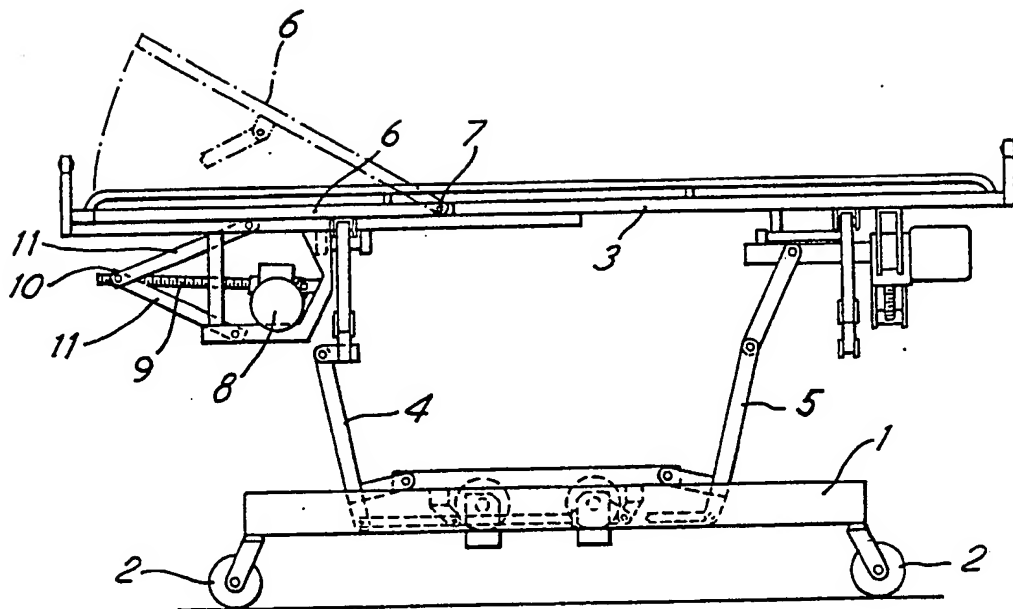


FIG. 1

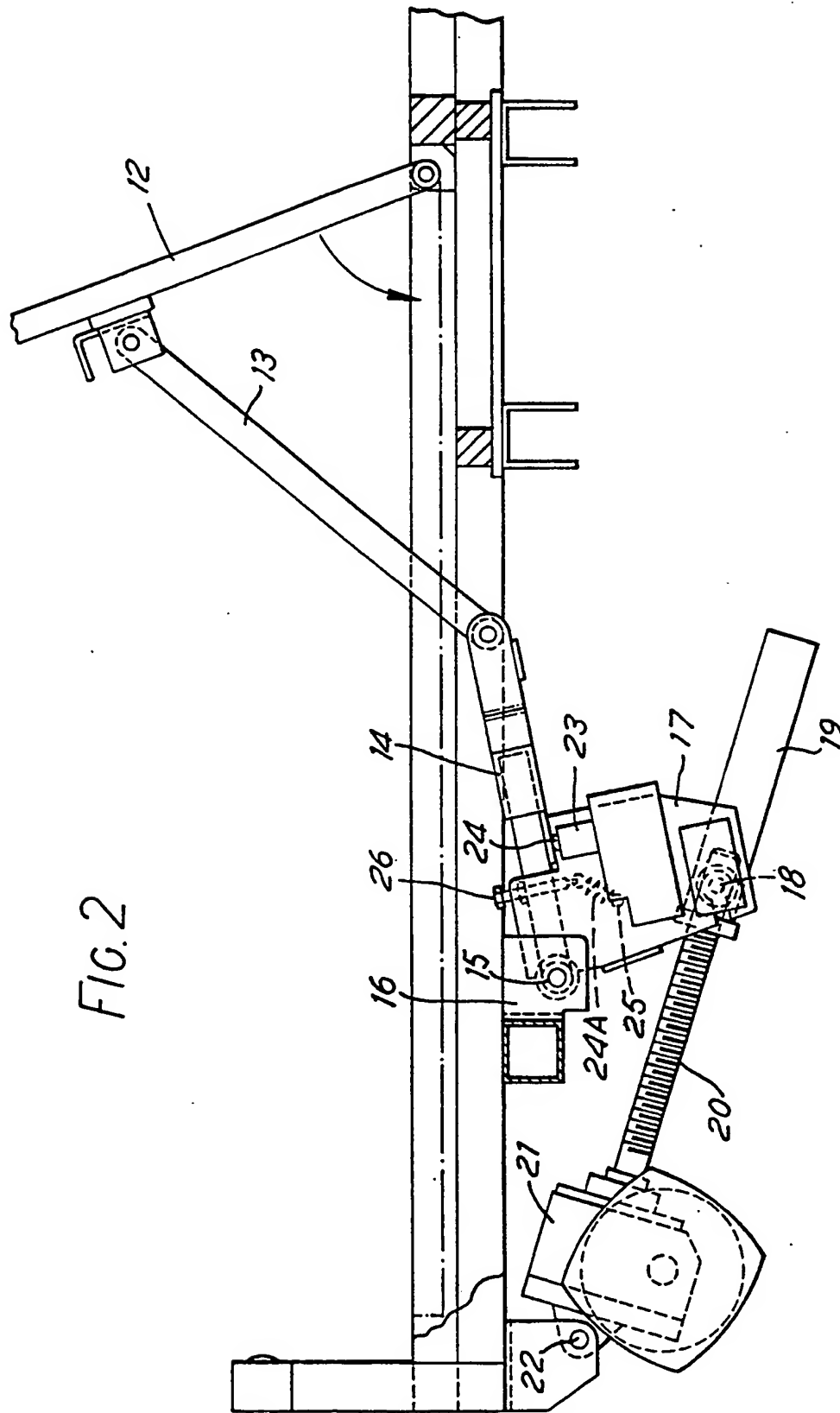
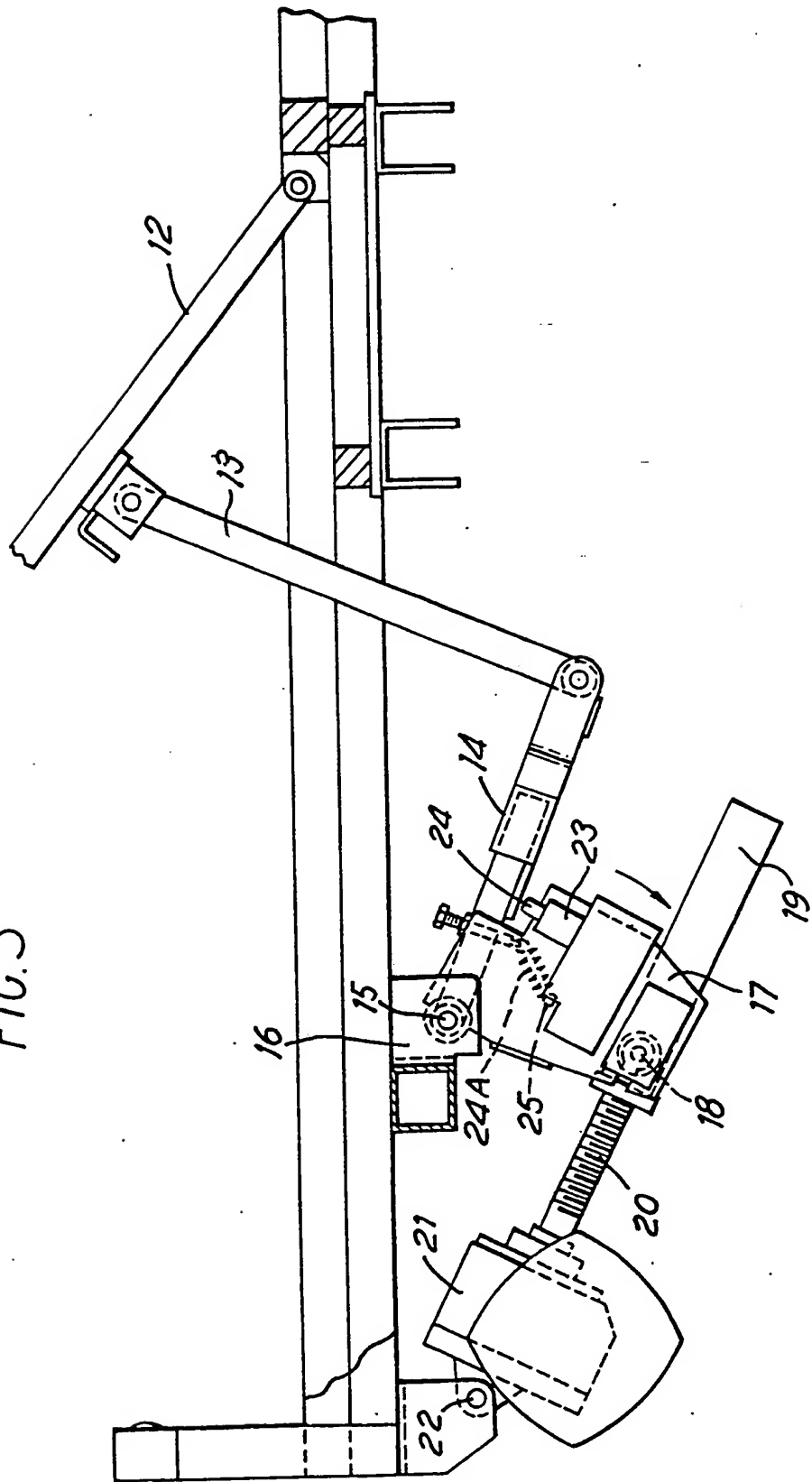


FIG. 2

FIG. 3



BED WITH HINGED PANEL SAFETY FEATURE

This invention relates to a bed of the type which has at least one hinged panel such as a back rest or leg raising panel.

Such beds are of particular utility in relation to hospital patients and other people who, due to incapacity or age or illness, require the use of a motorised back rest, leg raising panel, or other panel for raising different parts of the body.

The bed of this type is described in our U.K. Patent Specification 2167289A which describes and shows a multi-position bed having, among other features, a hinged back rest which can be raised and lowered by means of an electric motor.

One disadvantage that has arisen in practice is that when the back rest is being lowered with a patient on the bed it is possible for a nurse's arm to be trapped between the back rest and the bed frame as the back rest is lowered.

It is an object of the present invention to provide means for overcoming this disadvantage.

In accordance with the present invention, a bed includes at least one hinged panel, such as a back rest or leg raising panel, the panel being tiltable by a motor operating through a linkage and means being provided to stop the motor, during the lowering of the panel, if the movement of the panel is obstructed or inhibited e.g. by a persons arm.

The motor may be electric or hydraulic but in either case the means to stop the motor may comprise a switch or valve which is operable by contact with the back rest or

other panel and is so arranged that if movement of the back rest or other panel is inhibited the switch will operate to stop the motor.

5 The switch may, for example, be carried on a crank which is moveable by the motor and the crank may be in abutting contact with the panel so that as the crank turns it lifts the panel. The valve or switch may be carried by the crank and may have an operating plunger which is normally in contact with the panel. If movement of the
10 panel is inhibited separation will take place between the frame and the operating member of the plunger or switch so that the plunger or switch is operated so as to stop the flow of hydraulic fluid or electric current to the motor and thus stop the motor and prevent the continued movement
15 of the panel.

 The panel and crank may both be pivoted on the same axis and there may be a spring interconnecting the panel and crank so as to limit the separation between the two which can occur but so as to allow sufficient separation to
20 occur so that the switch or valve will operate.

 The panel, in the form of a back rest or leg rest, may be incorporated in a tilt and turn bed of the type described in our U.K. Patent 2167289 or in any other bed where the use of such a panel is desired.

25 Preferably the panel is operable by means of an electric motor which rotates a lead screw extending through a lead nut attached to the pivoted crank, the pivoted crank itself being in contact with a pivoted link and the link being in turn connected by a second link to the back
30 rest.

The spring, if used, can be attached to an adjustable post so that the tension may be varied. The adjustable post may simply be in the form of a bolt extending through a threaded hole in the link and having a spring connected at one end to the bolt and at the other end to the crank.

In the accompanying drawings:-

Fig.1 is a side elevation of a bed of the kind shown in our U.K. Patent 2167289A, the bed incorporating a hinged back rest;

Fig.2 is a side elevation of a modified form of mechanism for operating the back rest, incorporating the present invention, the mechanism being shown in a position in which the back rest is raised;

Fig.3 shows the same mechanism as in Fig.2 but in a position in which the back rest is being lowered but movement of the back rest has been inhibited.

In Fig.1 the bed shown is exactly as in U.K. Patent Specification 2167289A and therefore will not be described in detail. It consists of a base frame 1 carried on castors 2 and supporting a mattress platform 3. The mattress platform 3 is supported by a series of links 4 and 5 and the bed includes various motors and mechanisms for enabling the bed to be tilted and for turning operations to be carried out using the bed. All of this is described in full detail in our U.K. Patent 2167289A.

The mattress platform has hinged to it a back rest 6 which is pivoted at 7. The back rest is operable by a motor 8 driving a lead screw 9 which extends through a nut 10. The nut 10 moves a scissors type linkage 11, 11 so as to raise and lower the back rest 6. The back rest 6 is shown

in its fully lowered position in full line and its raised position in chain dotted line.

One problem with this back rest is that it is very easy for a nurse or other attendant to place an arm below the back rest while there is a patient on the bed and the back rest is being lowered. This can result in the nurse's arm being trapped beneath the back rest with possible serious consequences particularly when the patient is a heavy person.

In Fig.2 is shown the modifications necessary to this bed in order to carry out the present invention. The back rest 12 in Fig.2 is connected via a link 13 and a second telescopically extendable link 14 to a hinge point 15 on a fixed plate 16. Also hinged at 15 is a crank plate 17. The crank plate is pivoted at 18 to a lead nut 19 on a lead screw 20 rotatable by an electric motor 21 pivoted at 22.

An electric switch 23 has a switch plunger 24 which, in the position shown in Fig.2, is depressed by being in contact with the telescopic link 14.

A spring 24A serves to maintain this contact and to limit the angular extent by which the crank 17 and link 14 may separate. The ^{spring} link 24A is connected at one end to a post 25 on the crank 17 and at the other end to a bolt or adjusting device. The bolt extends through a threaded hole in the link 14 and may be adjusted to adjust the tension of the spring 24 to ensure that, normally, the switch plunger 24 is in full contact with the link 14.

In Fig.2 the parts are shown in the position they assume when the back rest 12 is fully raised. Now if the

motor 21 is operated to lower the back rest 12, the crank 17 will begin to turn in a clockwise direction about the pivot or hinge point 15 and link 14 will follow the crank in a clockwise direction thus causing link 13 to move downwardly and the back rest to gradually return to its horizontal position. If in the course of this operation the movement of the back rest 12 is inhibited e.g. by a persons arm being underneath it, the link 14 and crank 17 will separate thus allowing the switch plunger to move to the position shown in Fig.3 in which it will be seen that there is a space between the link 14 and the switch plunger. The switch is connected in circuit with an electric motor so that when it is in the position shown in Fig.3 the motor will stop.

A brake may also be incorporated in the electric motor so as to cause an immediate stop once the switch is operated.

Although shown applied to a back rest, clearly this invention may be applied equally to any other hinged panel used anywhere on the bed e.g. a side or tilting panel, a leg raising or foot raising panel, etc.

CLAIMS:

1. A bed including at least one hinged panel, the panel being tiltable by a motor operating through a linkage, and means being provided to stop the motor, during the lowering of the panel, if the movement of the panel is obstructed or inhibited.
2. A bed as claimed in Claim 1 wherein the motor is electric or hydraulic.
3. A bed as claimed in Claims 1 or 2 wherein the hinged panel is a back rest or a leg raising panel.
4. A bed as claimed in Claim 1, 2 or 3 wherein the means to stop the motor comprises a switch or valve operable by contact with the hinged panel and so arranged that if movement of the panel is inhibited the switch will operate to stop the motor.
5. A bed as claimed in Claim 4 wherein the switch or valve is carried on a crank moveable by the motor, the crank normally being in abutting contact with the panel so that as the crank turns in one sense it lifts the panel, and as it turns in the other sense it allows the panel to lower.
6. A bed as claimed in Claim 5 wherein the valve or switch has an operating plunger normally in contact with the panel, obstruction or inhibition of the lowering movement of the panel causing separation of the operating plunger from the panel and the motor to stop.
7. A bed as claimed in Claim 5 or 6 wherein the panel

and crank are pivoted on the same axis, and a spring interconnects the two to limit separation therebetween.

8. A bed as claimed in Claim 7 wherein the panel is operable by means of a motor which rotates a lead screw extending through a lead nut attached to the pivoted crank, the pivoted crank itself being in contact with a pivoted first link, and the first link in turn being connected by a second link to the panel.

9. A bed as claimed in Claim 7 or 8 wherein the spring is attached to an adjustable post whereby the tension therein may be varied.

10. A bed as claimed in Claim 9 wherein the post is in the form of a bolt extending through a threaded hole in the first link, the spring connecting at one end to the bolt and at the other end to the crank.

11. A bed substantially as shown in and as hereinbefore described with reference to Figures 2 and 3 of the accompanying drawings.